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“The Right to Information, The Right to Live”

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“Step Out From the Old to the New”

IS 5271 (1984): Paraformaldehyde [PCD 9: Organic Chemicals Alcohols and Allied Products and Dye Intermediates]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 5271 - 1984

Indian Standard
SPECIFICATION FOR
PARAFORMALDEHYDE
(*First Revision*)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PARAFORMALDEHYDE (*First Revision*)

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(*Continued on page 2*)

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(Continued on page 18)

Indian Standard
SPECIFICATION FOR
PARAFORMALDEHYDE
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 10 January 1984, after the draft finalized by the organic Chemicals (Misc) Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 Paraformaldehyde, also known as paraform, is a mixture of poly-oxymethylene glycols having the formula $\text{OH} (\text{CH}_2\text{O})_n \text{H}$, in which the value of n ranges from approximately 8 to 50.

0.3 Paraformaldehyde is a convenient source of gaseous formaldehyde for synthetic use and for disinfecting sick rooms, etc. It is used in the manufacture of synthetic resins and other miscellaneous preparations.

0.4 This standard was first published in 1969. The Committee responsible for the preparation of this standard felt that it should be revised with a view to meet the Defence, and pharmaceutical requirements. Accordingly, in this revised standard identification test and requirement of particle size have been included. The requirement of moisture content and water soluble chlorides and sulphate contents have also been added.

0.5 In the preparation of this standard, assistance has been derived from Joint Services Specifications, JSS 1010 'General methods of tests and assessment of impurities in chemicals/materials used in the manufacture of explosives and ammunition' and JSS 1106 'Paraformaldehyde, ammunition' published by the Ministry of Defence.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2 - 1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for paraformaldehyde used in the manufacture of ammunition protective composition, for disinfecting rooms (pharmaceutical) and also in the manufacture of synthetic resins.

2. REQUIREMENTS

2.1 Description — The material shall be in the form of a white amorphous powder or friable amorphous mass with pungent odour.

2.2 Particle Size — The particle size of the material shall be as follows :

Material retained on 600 micron 600 IS Sieve	Nil
Material retained on 125 micron IS Sieve, percent by mass, <i>Max</i>	15
Material retained on 90 micron IS Sieve percent by mass, <i>Max</i>	25

2.3 The material shall also comply with the requirements prescribed in Table 1, when tested according to methods prescribed in Appendix A.

3. PRECAUTION IN HANDLING

3.1 The material causes irritation skin, eyes, nose and throat and therefore, adequate care shall be exercised while handling the material.

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in suitable air tight bottles, barrels or fibre cans as agreed to between the purchaser and the supplier. The containers shall be securely closed after filling.

4.2 Marking — Each container shall bear legibly and indelibly by the following information :

- a) Name of the material ;
- b) Name of the manufacturer and his recognized trade-mark, if any;
- c) Batch number;
- d) Gross, net and tare mass; and
- e) The minimum cautionary notice worded as under.

‘HANDLE WITH CARE’

‘POISONOUS AVOID INHALATION AND CONTACT
WITH SKIN AND EYES’

(Causes irritation to eyes, skin and throat)

TABLE 1 REQUIREMENTS FOR PARAFORMALDEHYDE

(Clause 2.3 and Appendix A)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO CL NO. IN APPENDIX A)
(1)	(2)	(3)	(4)
i)	Identification	To pass the test	A-1
ii)	Aldehyde content (as HCHO), percent by mass, <i>Min</i>	95.0	A-2
iii)	Ash, percent by mass, <i>Max</i>	0.1	A-3
iv)	Heavy metals, excluding iron (as Pb), percent by mass, <i>Max</i>	0.005	A-4
v)	Iron content (as Fe), percent by mass, <i>Max</i>	0.002	A-5
vi)	Matter insoluble in water per- cent by mass, <i>Max</i>	0.1	A-6
vii)	Moisture content (under vacuum), percent by mass, <i>Max</i>	1.0	A-7
viii)	Water soluble chlorides (as NaCl), percent by mass, <i>Max</i>	0.05	A-8
ix)	Water soluble sulphates (as Na ₂ SO ₄), percent by mass, <i>Max</i>	0.1	A-9
x)	Acidity (as HCOOH), percent by mass, <i>Max</i> OR	0.05	A-10
	Alkalinity, pH, <i>Max</i>	8	A-11

4.2.1 The containers may also be marked with ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 Representative samples of the material shall be drawn and the criteria for conformity shall be as prescribed in Appendix B.

6. TEST METHODS

6.1 Tests shall be carried out according to the methods prescribed in Appendix A. Reference to relevant clauses of Appendix A is given in Col 4 of Table 1.

6.2 **Quality of Reagents** — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be used in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analyses.

APPENDIX A

(Clause 2.3)

METHODS OF ANALYSIS OF PARAFORMALDEHYDE

A-1. IDENTIFICATION TEST

A-1.1 Warm 0.04 g of the sample with 10 ml of sulphuric acid containing 0.2 g of salicylic acid; deep red colour is produced.

A-2. DETERMINATION OF ALDEHYDE CONTENT

A-2.0 **Outline of the Method** — The material is treated with sodium sulphite solution and the liberated sodium hydroxide is titrated with standard hydrochloric acid. The aldehyde content is then calculated from the amount of hydrochloric acid used.

A-2.1 Reagents

A-2.1.1 *Thymolphthalein Indicator* — Dissolve 0.1 g of thymolphthalein in 100 ml of 80 percent rectified spirit (*see* IS : 323-1959†).

A-2.1.2 *Sodium Hydroxide Solution* — approximately 0.1 N.

*Specification for water for general laboratory use (*second revision*).

†Specification for rectified spirit (*revised*).

A-2.1.3 Sodium Sulphite Solution — Dissolve 126 g of anhydrous sodium sulphite or 252 g of the hydrated salt in water and dilute to 1000 ml.

A-2.1.4 Hydrochloric Acid — approximately 0.1 N.

A-2.1.5 Standard Hydrochloric Acid — 1 N.

A-2.2 Procedure

A-2.2.1 Weigh accurately 1.0 to 1.2 g of the material into a 250-ml conical flask and add to it 75 ml of water. Swirl the mixture for five minutes. Add two drops (approximately 0.1 ml) of the thymolphthalein indicator followed by the sodium hydroxide solution drop by drop until a faint colour is just perceptible.

A-2.2.2 Measure 75 ml of freshly prepared sodium sulphite solution into a second 250-ml conical flask. To it add two drops (approximately 0.1 ml) of the thymolphthalein indicator followed by hydrochloric acid (0.1 N) until the blue colour just disappears. Add this solution to the neutralized solution of the material (see A-2.2.1). Mix by swirling for two minutes and then titrate with standard hydrochloric acid until the blue colour just disappears.

A-2.3 Calculation

Aldehyde content (as HCHO), percent by mass

$$= \frac{3.003 \times V \times N}{M}$$

where

V = volume in ml of standard hydrochloric acid used ;

N = normality of standard hydrochloric acid ;

M = mass in g of the material taken for the test.

A-3. DETERMINATION OF ASH

A-3.0 Outline of the Method — A known quantity of the material is ignited at $600 \pm 25^\circ\text{C}$ and the ash cooled and weighed.

A-3.1 Apparatus

A-3.1.1 Basin — made of silica.

A-3.1.2 Furnace — Capable of maintaining a temperature of $600 \pm 25^\circ\text{C}$.

A-3.2 Procedure — Gently volatilize 10.0 g of the material in successive small portions in the weighed basin and ignite the residue at $600 \pm 25^\circ \text{C}$. Cool in a desiccator and weigh. Preserve the residue for the determination of heavy metals (see A-4).

A-3.3 Calculation

$$\text{Ash, percent by mass} = \frac{M_1}{M_2} \times 100$$

where

M_1 = mass in g of the residue after ignition, and

M_2 = mass in g of the material taken for the test.

A-4. DETERMINATION OF HEAVY METALS (EXCLUDING IRON) (AS Pb)

A-4.0 Outline of the Method — The colour produced by heavy metals with hydrogen sulphide is compared to that produced by standard lead solution under identical conditions.

A-4.1 Apparatus

A-4.1.1 Nessler Cylinders — 50 ml capacity, two (see IS : 4161-1967*).

A-4.2 Reagents

A-4.2.1 Ammonium Hydroxide—10 percent (*m/v*).

A-4.2.2 Hydrochloric Acid — approximately 0.1 N.

A-4.2.3 *p*-Nitrophenol Indicator — 0.25 percent (*m/v*) aqueous solution.

A-4.2.4 Hydrogen Sulphide Solution — saturated in water.

A-4.2.5 Standard Lead Solution — Dissolve 1.60 g of lead nitrate [$\text{Pb}(\text{NO}_3)_2$] in water and dilute to 1 000 ml with water. Further dilute 10 ml of this solution to 1 000 ml freshly when required. One millilitre of the resulting solution will contain 0.01 mg of lead (as Pb).

A-4.3 Procedure

A-4.3.1 Dissolve the residue obtained in the determination of ash content (see A-3.2) in 0.5 ml of hydrochloric acid by warming, if necessary. Add 3 drops of *p*-nitrophenol indicator and then add ammonium hydroxide dropwise until the solution turns yellow. Add hydrochloric acid dropwise until the solution becomes colourless again and then add 2.5 ml of the acid in excess. Dilute to 100 ml with water. Use 10 ml of this solution for the determination of heavy metals.

*Specification for Nessler cylinders.

A-4.3.2 Take 5 ml of the standard lead solution in Nessler cylinder and make it neutral to *p*-nitrophenol indicator by using ammonium hydroxide and hydrochloric acid, as described in A-4.3.1. Add 2.5 ml excess of hydrochloric acid. Add 5 ml of hydrogen sulphide solution and dilute to 50 ml.

A-4.3.3 Take 10 ml of the solution obtained in A-4.3.1 in the second Nessler cylinder and add 5 ml of hydrogen sulphide solution. Dilute to 50 ml.

A-4.3.4 The material shall be taken to have not exceeded the limit prescribed in Table 1 if the colour produced in the test with material in (A-4.3.3) is not deeper than that produced by the standard lead solution (in A-4.3.2).

A-5. DETERMINATION OF IRON CONTENT (AS Fe)

A-5.0 Methods—Two methods, namely, Method A and Method B, have been prescribed. In case of dispute, Method A shall be used.

A-5.0.1 Outline of the Methods — The material is converted into sulphate by evaporation of the material to dryness with sulphuric acid and then with hydrogen peroxide. The iron content is then determined by using 2,2'-bipyridyl.

A-5.1 Method A (Spectrophotometric or Electrophotometric Method)

A-5.1.1 Apparatus

A-5.1.1.1 One-mark graduated flasks — two of 1000-ml and one of 100 ml capacity (see IS : 915-1975*).

A-5.1.1.2 Spectrophotometer or electrophotometer

A-5.1.1.3 Beakers — 400 ml capacity.

A-5.1.2 Reagents

A-5.1.2.1 Dilute sulphuric acid — 20 percent (v/v).

A-5.1.2.2 Hydrogen peroxide — '50 volumes'.

A-5.1.2.3 Hydroxyammonium chloride solution — Dissolve 100 g of hydroxy-ammonium chloride in 1 000 ml of water.

A-5.1.2.4 Ammonium acetate solution — Dissolve 50 g of ammonium acetate in 100 ml of water.

A-5.1.2.5 2,2'—Bipyridyl solution — Dissolve 0.5 g of 2,2'-bipyridyl in 100 ml of dilute hydrochloric acid (1 N).

*Specification for one-mark graduated flask (first revision).

A-5.1.2.6 Standard iron solution — Dissolve 0.7022 g of ammonium ferrous sulphate $[(\text{NH}_4)_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot 6\text{H}_2\text{O}]$ in 50 ml of dilute sulphuric acid and when transfer to one of the 1 000 ml one-mark graduated flasks. Dilute to 1 000 ml mark. Pipette out 100 ml of this solution into the second 1 000 ml one-mark graduated flasks. Dilute this 100 ml of the solution again with water to 1 000 ml mark. One millilitre of this solution contains 0.01 mg of iron (as Fe).

A-5.1.3 Calibration Charts — Place in 400-ml beakers, 2.0 ml, 4.0 ml, 7.0 ml, 10.0 ml, 15.0 ml, 20.0 ml, etc, of the standard iron solution. Add to each, in successive small portions, 10 ml of hydrogen peroxide and 10 ml, of dilute sulphuric acid, then heat on a sand-bath until acid fumes are evolved. Allow to cool to room temperature and transfer the solutions quantitatively to 100-ml one-mark graduated flasks. Add to each, 2 ml of hydroxyammonium chloride solution. Mix and allow to stand for two minutes. Then add 30 ml of ammonium acetate solution and 5 ml of 2,2'-bipyridyl solution, and dilute to the mark. Measure the optical densities of the solutions in a spectrophotometer or electrophotometer at a wavelength between 510 and 520 nm. Draw a graph plotting optical densities as a function of the quantities of iron in 100 ml of the solutions.

A-5.1.4 Procedure — Weigh accurately about 3 g of the material into a 400-ml beaker and add 20 ml of water followed by 10 ml of dilute sulphuric acid. Evaporate the mixture on a sand-bath until acid fumes are evolved. Allow to cool to room temperature. Add to the cold solution, in successive small portions, 10 ml of hydrogen peroxide and heat on the sand-bath until acid fumes are evolved. Allow to cool again to room temperature and transfer the solution quantitatively to a 100-ml one-mark graduated flask. Add 2 ml of hydroxy ammonium chloride solution, mix and allow to stand for two minutes. Then add 30 ml of ammonium acetate solution and 5 ml of 2,2'-bipyridyl solution and dilute to 100 ml.

A-5.1.4.1 Measure the optical density of the solution in the spectrophotometer or electrophotometer at a wavelength between 510 and 520 nm and by reference to the calibration chart (see A-5.1.3) read the iron content corresponding to this optical density.

A-5.1.5 Calculation

Iron content (as Fe), percent by mass

$$= \frac{M_1 \times 100}{M_2}$$

where

M_1 = mass in g of iron as read from the calibration chart (see A-5.1.4.1); and

M_2 = mass in g of the material taken for the test (see A-5.1.4).

A-5.2 Method B (Visual Method)**A-5.2.1 Apparatus**

A-5.2.1.1 Nessler cylinders — 100 ml capacity, two (see IS : 4161-1967*).

A-5.2.2 Procedure — Prepare the solution of material as in **A-5.1.4** and transfer the solution quantitatively to one of the Nessler cylinders. Dilute with water to 100-ml mark. To about 60 ml of water in the second Nessler cylinder add 2 ml of hydroxyammonium chloride solution, 30 ml of ammonium acetate solution and 5 ml of 2,2'-bipyridyl solution. Add standard iron solution slowly from a burette, shaking with each addition, until the depth of the colour in the two cylinders is identical when they are viewed along their axes. Record v the volume of standard iron solution added.

A-5.2.3 Calculation

Iron content (as Fe), percent by mass

$$= \frac{V \times 0.000\ 01 \times 100}{M}$$

where

V = volume in ml of standard iron solution required to match the colour (see **A-5.2.2**); and

M = mass in g of the material taken for the test (see **A-5.1.4**).

A-6. DETERMINATION OF MATTER INSOLUBLE IN WATER**A-6.1 Apparatus**

A-6.1.1 Flask — round-bottom, of 150 ml capacity (see IS : 1381 (Part 1) 1976†)

A-6.1.2 Oven — capable of maintaining temperature at $100 \pm 2^\circ\text{C}$.

A-6.2 Reagent

A-6.2.1 Sodium Hydroxide Solution — 30 percent (m/v).

A-6.3 Procedure — Weigh accurately about 5 g of the material in a 150-ml flask. Add 100 ml of water and one drop (approximately 0.05 ml) of the sodium hydroxide solution. Boil gently for 30 minutes avoiding any substantial loss of water. Filter off any insoluble matter using a weighed sintered glass crucible. Wash with water and dry for

*Specification for Nessler cylinders.

†Specification for boiling flask : (Part 1) Flasks with plain neck (first revision).

30 minutes in an oven at a temperature of $100 \pm 2^\circ\text{C}$. Cool in a desiccator and weigh.

A-6.4 Calculation

$$\text{Matter insoluble in water, percent by mass} = \frac{M_1 \times 100}{M_2}$$

where

M_1 = mass in g of the insoluble residue; and

M_2 = mass in g of the material taken for the test.

A-7. DETERMINATION OF MOISTURE CONTENT (UNDER VACUUM)

A-7.1 Apparatus

A-7.1.1 Vacuum Desiccator

A-7.1.2 Flat Bottom Dish — made of glass or aluminium approximately 6 cm in diameter and 3 cm deep with good fitting cover.

A-7.1.3 Vacuum Pump

A-7.2 Reagents

A-7.2.1 Desiccant — concentrated sulphuric acid.

A-7.3 Procedure — Heat the flat bottomed clean glass or aluminium dish with a cover in boiling water for about 30 minutes. Cover the dish and cool it in the desiccator to room temperature and weigh accurately. Place about 5 g of the sample and weigh again. Keep the dish (half opened) in the vacuum desiccator and evacuate the desiccator with the help of the vacuum pump. Allow the sample to remain in the evacuated desiccator for 24 hours. Release the vacuum slowly by allowing any air to pass in. Cover the dish and weigh.

A-7.4 Calculation

$$\text{Moisture content, percent by mass} = \frac{(M_2 - M_3) \times 100}{(M_2 - M_1)}$$

where

M_1 = mass in g of the empty dish ;

M_2 = mass in g of the dish and sample before desiccation; and

M_3 = mass in g of the dish and sample after desiccation.

A-8. DETERMINATION OF WATER SOLUBLE CHLORIDES (as NaCl)

A-8.1. Reagents

A-8.1.1 *Dilute Nitric Acid* (1:4)

A-8.1.2 *Standard Silver Nitrate Solution* — 0.05 N.

A-8.1.3 *Standard Potassium Sulphocyanide Solution* — 0.05 N.

A-8.1.4 *Ferric Alum Indicator* — 10 percent solution.

A-8.2 Procedure — Weigh accurately about 5 g of the sample and extract in about 100 ml of distilled water. Filter the solution through a whatman filter paper (No. 40). Wash the residue using about 5 to 10 ml of distilled water and 20 ml of dilute nitric acid (free from lower oxides of nitrogen which give a colour with thiocyanate). Add a measured excess of 0.05 N silver nitrate solution (A-8.1.2). If a significant palecence due to the precipitation of silver chloride is obtained, shake the flask till all the silver chloride has coagulated and then titrate with 0.05 N potassium sulphocyanide solution (A-8.1.3) using 5 ml of 10 percent ferric alum solution as internal indicator. Carry out a blank determination with sample using all the reagents.

A-8.3 Calculation

Water soluble chlorides

$$(\text{as NaCl}), \text{ percent by mass} = \frac{(V_1 - V_2) \times N \times F \times 0.05846 \times 100}{M}$$

where

V_1 = volume in ml of standard potassium sulphocyanide solution used for the blank ;

V_2 = volume in ml of standard potassium sulphocyanide solution used for the sample ;

N = normality of standard potassium sulphocyanide solution;

F = factor of standard potassium sulphocyanide solution; and

M = mass in g of sample taken.

A-9. DETERMINATION OF WATER SOLUBLE SULPHATES as (Na_2SO_4)

A-9.1 Apparatus

A-9.1.1 *Silica Gooch Crucible*

A-9.1.2 *Muffle Furnace*

A-9.1.3 Desiccator**A-9.2 Reagents****A-9.2.1 Concentrated Hydrochloric Acid****A-9.2.2 Barium Chloride Solution** — 10 percent.

A-9.3 Procedure — Weigh accurately about 5 g of the sample in a 500 ml beaker and dissolve in 100 ml of distilled water. Filter through whatman filter paper (No. 40) into a 500 ml beaker. Wash the residue two to three times using about 10 ml of distilled water. Acidify the solution with about 10 to 15 ml of concentrated hydrochloric acid. Make up the solution with distilled water to about 250 ml and boil. Add 5 ml of 10 percent hot barium chloride solution to the boiling solution and allow it to stand overnight. Filter the precipitate on a weighed silica gooch crucible (M_1). Wash the residue with distilled water, dry and ignite. Cool the crucible to room temperature in a desiccator and weigh again (M_2).

A-9.4 Calculation

Water soluble sulphates (as Na_2SO_4), percent by mass

$$= \frac{(M_2 - M_1) \times 0.746 \times 100}{M}$$

where

M_1 = mass in g of empty silica gooch crucible,

M_2 = mass in g of silica gooch crucible with residue after ignition,
and

M = mass in g of the sample taken.

A-10. DETERMINATION OF ACIDITY (as HCOOH)**A-10.1 Reagents**

A-10.1.1 Sodium Hydroxide Solution — approximately 0.1 N.

A-10.1.2 Standard Hydrochloric Acid — 0.1 N.

A-10.1.3 Bromothymol Blue Indicator — Dissolve 0.1 g of bromothymol blue in 100 ml of 50 percent rectified spirit (see IS : 323 - 1959*).

A-10.2 Procedure — Weigh accurately about 10 g of the material in a 250 ml conical flask. Add 25 ml of the sodium hydroxide solution and swirl the mixture for 5 minutes. Titrate the suspension with standard hydrochloric acid using 4 drops (approximately 0.2 ml) of the bromothymol blue indicator. Carry out a blank determination.

*Specification for rectified spirit (revised).

A-10.3 Calculation

$$\text{Acidity (as HCOOH), percent by mass} = \frac{4.6 (V_1 - V_2) N}{M}$$

where

V_1 = volume in ml of standard hydrochloric acid used in the blank;

V_2 = volume in ml of standard hydrochloric acid used in the test with the material;

N = normality of standard hydrochloric acid; and

M = mass in g of the material taken for the test.

A-11. DETERMINATION OF ALKALINITY

A-11.1 Procedure — Shake 5 g of the material passing through 125 micron IS Sieve with 100 ml of freshly boiled and cooled distilled water. Filter and wash the residue thoroughly with 25 ml distilled water. Determine the pH of the aqueous extract in accordance with 4.3 of IS : 5741 - 1970*.

A P P E N D I X B

(Clause 5.1)

SAMPLING OF PARAFORMALDEHYDE**B-1. GENERAL REQUIREMENT FOR SAMPLING**

B-1.1 Samples shall be taken in a protected place not exposed to damp air, dust or soot.

B-1.2 The sampling instrument shall be clean and dry.

B-1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination (see 3.1).

B-1.4 To draw a representative sample, the content of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

*Methods for determination of pH.

B-1.5 The samples shall be placed in suitable, clean, dry and airtight glass bottles or other containers on which the material has no action.

B-1.6 The sample containers shall be of such a size that an ullage of about 5 percent is left after pouring in the sample.

B-1.7 Each sample container shall be sealed airtight after filling and marked with full details of sampling, the date of sampling and details given under 4.2 (a, b, c, and d).

B-2. SCALE OF SAMPLING

B-2.1 Lot — All the containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be, marked separately and the containers in each batch shall constitute a separate lot.

B-2.2 For ascertaining the conformity of the material in the lot to the requirements of this specification, samples shall be tested from each lot separately.

B-2.3 The number of containers to be selected at random from a lot shall depend upon the size of the lot and shall be according to Table 2.

B-2.3.1 These containers shall be selected at random from the lot. In order to ensure the randomness of selection, procedures given in IS : 4905 - 1968* may be followed.

TABLE 2 SCALE OF SAMPLING

(Clause B-2.3)

NUMBER OF CONTAINERS IN THE LOT	SAMPLE SIZE
(1)	(2)
Up to 15	3
16 to 50	4
51 to 100	5
101 to 150	6
151 to 300	7
301 to 500	8
501 to 1 000	9
1001 and above	10

*Methods of random sampling.

B-3. TEST SAMPLES AND REFEREE SAMPLES

B-3.1 From each of the containers selected according to **B-2.3**, a representative portion of the material shall be taken from different parts of the container. From each of these individual portions a small but approximately equal quantity of the material shall be taken and thoroughly mixed to constitute a composite sample of not less than 600 g. The composite sample shall be divided into three equal parts, one for the purchaser, another for the supplier and the third to be used as a referee sample. These shall be transferred to separate sample containers and labelled with full identification particulars of the sample given in **B-1.7**.

B-3.2 The referee sample shall bear the seals of purchaser and the supplier. It shall be kept at a place and under the conditions agreed to between the purchaser and the supplier so as to be used in case of a dispute between the two.

B-4. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-4.1 Tests for the determination of all the characteristics given in 2 of this specification shall be carried out on the composite sample.

B-4.2 The lot shall be declared as conforming to the requirements of this specification, if all the test results on the composite sample meet the corresponding requirements given in the specification, otherwise not.

(Continued from page 2)

<i>Members</i>	<i>Representing</i>
SHRI R. B. DESAI	Cibatul Ltd, Atul
DR S. K. SINHA (<i>Alternate</i>)	
DR P. V. DESHMUKH	Hindustan Antibiotics Ltd, Pune
DR G. R. DESHPANDE (<i>Alternate</i>)	
SHRI F. M. FAQUIH	Morani Chemicals Pvt Ltd, Bombay
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SHRI A. D. PATANKAR (<i>Alternate</i>)	
SHRI A. V. VENKATESH	Indian Petrochemicals Corporation Ltd, Bombay
SHRI R. SARANGRAJAN (<i>Alternate</i>)	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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